

```

#                                     A d v a n c e d
#      0000 00000 0000 00 00 0 00000
#      0 00 0 0 00 00 00 00 0 00000
#      0 0 00000 00 00 00 00 0
#      0000 0 0 0 0 0000 0 00000
#      Advanced Gravis Computer Technology Ltd.
#
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#      FidoNET: 1:153/978                      SBCNET: 13:900/3
#      AOL: Adv Gravis                        Genie: Page M805 Topic 6

```

```

#      MEGA-EM VERSION 2.07 - 02/22/95
#      USERS MANUAL
#      Copyright (C) 1993-1995 by Advanced Gravis Computer Technology Ltd.
#      All Rights Reserved

```

```

#      0.0 Quick Readme Information
#      1.0 Legal Information
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#      8.0 Mega-Em Revision History

```

#### #0.0.0 \*\*\*\*\* CHAPTER 0. - QUICK README INFORMATION \*\*\*\*\*

#All internet support questions regarding Mega-Em should be sent via email  
#to: jayeson@gravis.com (Jayeson Lee-Steere)

Quick notes: You must run MEGAEM, then EMUSET before any emulation is active.

Always run EMUSET between programs. This will reset Mega-Em internally. Many games require the sound devices to be in a power on state to work correctly.

Should you choose to use a real Sound Blaster instead of Mega-Em's emulation, you must run MEGAEM with the /SB0FF switch.

All known compatibility problems are listed in chapter 5 of this manual.

Remove any debuggers from memory before loading Mega-Em.

```

#      IMPORTANT: Adaptec SCSI users must read section 4.1.2 of
#      this manual before using Mega-Em.

```

#### #1.0.0 \*\*\*\*\* CHAPTER 1. - LEGAL INFORMATION \*\*\*\*\*

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Burnaby, B.C. V5J 5E9  
CANADA

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## #2.0.0 \*\*\*\*\* CHAPTER 2. - INTRODUCTION \*\*\*\*\*

Mega-Em is a software program which allows you to emulate sound devices other than those present in your system. Mega-Em allows you to emulate the Roland MT-32 and Sound Canvas and the Sound Blaster (Digital Only) using a Gravis UltraSound (GUS) sound card. Sound Blaster Music and Roland MPU-401 MIDI interface emulation through the UltraSound MIDI port is planned for the future.

Mega-Em has the following features:

- \* High Quality Roland Sound Canvas and MT-32 music emulation.
- \* Sound Blaster Digital (DAC) emulation, with generally improved sound quality over a real Sound Blaster card.
- \* Loads entirely into the EMS memory space - uses no low/upper DOS memory.
- \* Fast - entirely written in assembler, utilizing the 386 instruction set
- \* High level of customization, while still retaining ease of use.

Mega-Em currently requires the following to function correctly:

- \* A 386 or better AT class personal computer.
- \* A hard drive.
- \* A Gravis UltraSound card.
- \* An Expanded Memory Manager, such as EMM386.EXE, QEMM386 or 386MAX.
- \* Approximately 64k of free Expanded Memory (EMS). Mega-Em uses no low DOS memory (i.e. Memory in the 1st megabyte).

#NOTE: Adaptec SCSI users MUST read section 4.1.2 of this manual.

## #3.0.0 \*\*\*\*\* CHAPTER 3. - INSTALLATION \*\*\*\*\*

To install Mega-Em to your hard drive do the following.

Step 1. Make and enter a directory where you wish to install Mega-Em. For example if you wish to install to the directory C:\MEGAEM, type the following:

```
C: <ENTER>
MD \MEGAEM <ENTER>
CD \MEGAEM <ENTER>
```

Step 2. Unzip the Mega-Em distribution archive into this directory. For example if the archive is on a floppy disk in drive A:, you would type:

```
PKUNZIP A:\MEGEM* <ENTER>
```

Step 3. It is now recommended that you add the Mega-Em directory to your path. Only experienced users should try other methods such as creating aliases for the executables.

To add this directory to your path do the following:

Edit your AUTOEXEC.BAT file (in the root directory of your boot drive) using a text editor. eg:

```
EDIT AUTOEXEC.BAT <ENTER>
```

Look for a line that starts with PATH= or SET PATH=. eg:

```
PATH=C:\DOS;C:\ULTRASND
```

Add the directory name to the end of this line. For the above example the line should look like this:

```
PATH=C:\DOS;C:\ULTRASND;C:\MEGAEM
```

Save the file.

Reboot your computer.

Mega-Em is now installed and ready to use.

#### #4.0.0 \*\*\*\*\* CHAPTER 4. - MEGA-EM USAGE \*\*\*\*\*

##### # 4.1.0 Loading Mega-Em and Configuring The Emulation

##### # 4.1.1 Overview

##### # 4.1.2 Mega-Em Command Line Options

##### # 4.1.3 Emuset Command Line Options

##### # 4.1.4 The Default Options Files

##### # 4.2.0 Configuring Software For Use With Mega-Em

##### # 4.3.0 A Step By Step Example

#### #4.1.0 LOADING MEGA-EM AND CONFIGURING THE EMULATION.

##### #4.1.1 OVERVIEW

Mega-Em consists of two main parts. The first being the MEGAEM.EXE executable which must be loaded first to provide your system with emulation capability. This program should be considered a driver: just loading this alone will not allow you to emulate anything. The second is the EMUSET.EXE executable which allows you to turn emulations on or off, and control which devices Mega-Em will emulate (e.g. MT-32, Sound Canvas and/or Sound Blaster).

For example, first load MEGAEM.EXE by typing:

```
MEGAEM [options] <ENTER>
```

Valid MEGAEM.EXE options are listed in section 4.1.2, and are optional. Assuming there were no problems, you should see INSTALLATION SUCCESSFUL printed on the screen, and the resident driver portion of Mega-Em will now be in memory. In most cases you should be able to leave MEGAEM.EXE loaded indefinitely, switching emulation on and off as needed with

EMUSET.EXE. You can uninstall Mega-Em from memory at any time by typing MEGAEM -F.

Now when you wish to run a program requiring emulation, type:

EMUSET [options] <ENTER>

Valid EMUSET.EXE options are listed in section 4.1.3, and are optional. Mega-Em will now be configured for the emulation you specified, and you are ready to run your software.

#Note that when emulation is active, Mega-Em hides the UltraSound from any  
#other programs. Be careful to disable emulation by typing EMUSET OFF  
#before running any 'native' UltraSound software.

In addition it is recommended that you run EMUSET between running different software programs, as this will reset Mega-Em internally.

Confused? Read on. There is a step by step example in section 4.3

#### #4.1.2 MEGAEM.EXE COMMAND LINE OPTIONS

The following options can be added to the MEGAEM.EXE command line. As you can see all options should be preceded by a '-', but can also be preceded by a '/', or just separated by a space.

- H or -? Display the MEGAEM.EXE help screen, which is basically a shortened version of this section of the manual.
- U or -F Uninstall Mega-Em from memory. Can also be referred to as removing or freeing Mega-Em from memory. This option should normally only be used with no other options on the command line.
- ROFF Turns off Roland emulation.
- SBON Turns on Sound Blaster emulation. Default for normal UltraSound cards.
- SBOFF Turns off Sound Blaster emulation. Default for UltraSound ACE.
- RIRQx Specify Roland Irq number. By default Mega-Em will not generate any Roland Irqs since very little software requires it. If your software fails on Roland initialization, you should use this option, preferably using Irq 2. Valid values are x=2,3,5 or 7.
- NOEMS Forces Mega-Em to load when EMS services are disabled (for example, when the NOEMS option is used in your EMM386 command line). Note that you must still have a memory manager loaded to run Mega-Em. Caution must be exercised when using this option, since Mega-Em will use EMS to activate your memory manager. You must manually make sure your memory manager is active to use this option. Adding EMM386 ON to your AUTOEXEC.BAT will, for example, achieve this. If you have programs loaded into upper memory, the memory manager will most likely be active.
- RGDT Relocate server GDT. This switch may be needed on some systems with certain memory managers for Mega-Em to operate correctly. You should only use this option if the system crashes as MEGAEM.EXE loads, or the system becomes very unstable after MEGAEM.EXE has been loaded, or MEGAEM.EXE suggests you use it.

It is possible that using this option may cause the above mentioned problems. Use with caution.

-FGDT Force server GDT expansion. This switch may allow Mega-Em to be used with system/memory manager combinations which cause MEGAEM.EXE to respond with 'EMM Incompatibility Error: Can not expand server GDT'. There is however a good chance that using this option will crash the system as MEGAEM.EXE loads, or renders the system unstable after MEGAEM.EXE has loaded. This option has precedence over the -RGDT option. Use with caution.

-P Enable Adaptec (or compatible) SCSI controller protection.

# IMPORTANT: Adaptec SCSI users must read this. Failure to read  
# and understand this option may result in loss of data  
# on SCSI drives. If you are not using an Adaptec SCSI  
# device ignore this option.

Mega-Em requires special consideration when used with some Adaptec SCSI devices. Many Adaptec SCSI controllers are factory set to operate at an I/O base address of 330 (hex). Check your controller manual, if your controller is not set to this address you do not need to use this option. If you can change the base address of your card, it is recommended that you do so and avoid using this option.

What's the big deal you ask? Well unfortunately 330 (hex) is also the default base address for the Roland MPU-401 MIDI interface (i.e. Roland sound devices). This means any software attempting to access a Roland card will instead access the SCSI controller, resulting in the controller crashing, and possible loss of data. In addition, without the -P option, Mega-Em will consider any SCSI drivers to be Roland software, stopping the SCSI controller from getting any commands, resulting a guaranteed system crash.

Mega-Em overcomes the problem by distinguishing between Roland and SCSI software. Any software loaded into the low 640k memory area BEFORE Mega-Em, and any software in the ROM BIOS/High/Upper Memory area is considered to be SCSI software. Any software loaded into the low 640k memory area after Mega-Em is considered to be Roland software.

This is not ideal. You must never load any SCSI software which accesses the controller directly into low memory after Mega-Em (including AFDISK.EXE). More importantly you must never load any Roland software into High Memory, or before Mega-Em.

If you do not correctly understand what this option does and are using an Adaptec SCSI device, please do not use Mega-Em until you do understand.

The following options are not listed on the Mega-Em help screen. They are primarily for debugging purposes, and are included here since they may be of use to some users.

-SBBxxx Specify Sound Blaster base address. By default Mega-Em will use the UltraSound base address. This is primarily a debugging feature allowing Mega-Em's Sound Blaster emulation to operate over the top of a real Sound Blaster. Note that the occasional DMA failure (and hence system crash) may occur with a real Sound

Blaster installed in the system. Valid values are xxx=210,220, 230,240,250 or 260.

- SBIX Specify Sound Blaster Irq. Another debugging feature purely for testing Sound Blaster software with different Irqs. By default Mega-Em will use the UltraSound MIDI Irq. Valid values are x=2,3,5 or 7. 7 is the recommended value, since a number of programs are 'hard coded' to use this value.
- MEMx Manually specifies the amount of memory on the UltraSound card. There should be no need to use this option, since Mega-Em should correctly auto-detect the amount of memory on the UltraSound card.

x=1,2,3,4 for 256k,512k,768k,1024k respectively.

#### #4.1.3 EMUSET.EXE COMMAND LINE OPTIONS

The following options can be added to the EMUSET.EXE command line. As can be seen all options should be preceded by a '-', but can also be preceded by a '/', or just separated by a space.

- H or -? Display the EMUSET.EXE help screen, which is basically a shortened version of this section of the manual.
- OFF Turns emulation off. The default is to turn emulation on. For example just typing EMUSET <ENTER> will activate the emulation, with default options. Typing EMUSET -OFF <ENTER> will then disable any emulation.
- MT Emulate a Roland MT-32/LAPC1. The default is to emulate a Roland Sound Canvas. You should use this option if your software does not have Sound Canvas/SCC1/General MIDI support, but does have MT-32/LAPC1/Roland support. ("Roland" alone usually refers to the MT-32/LAPC1 devices).
- L Enable the UltraSound line input. This option can be useful in some situations, such as when using a real Sound Blaster card.
- Mxx Specify music volume level. The default level is 12. The valid range is xxx=1-16. For the technically minded, this switch adjusts the volume in 3dB increments.
- Vxx Specify master volume level. The default level is 16. The valid range is xxx=1-16. For the technically minded, this switch also adjusts the volume in 3dB increments.
- MONO Set music playback to mono. The default mode is stereo playback. This option can be useful since a few pieces of music will cause audible crackling during very fast stereo pans.
- SS Causes sustained instruments to slowly fade away. With some software programs, the notes will become stuck and without this option, become very annoying.
- CO n Coexist with real MPU-401 MIDI interface. While Mega-Em will function correctly with a real MPU-401 MIDI interface installed in the system, no software will be able to access the real interface while emulation is active and these options are not used. These options allow Mega-Em to be used together with a

real MPU-401 MIDI interface. This can be useful for DOS based MIDI sequencers. Note that when using this option, Mega-Em no longer emulates the MPU-401 interface, however will intercept all data sent to it.

- C01 Allow both input and output to real MPU-401. With this option music will play through both the external MIDI device(s) and the selected Mega-Em output device.
- C02 Only allows input from real MPU-401. Music will only play through the selected Mega-Em output device. Using this option may also increase Mega-Em's compatibility on systems with a real MPU-401.

The following options are not listed on the EMUSET help screen. They are generally not needed, but are provided since they may be of use to some users.

- V0xx Specify the number of voices used for emulation output. The valid range for xx is 14 to 32, with the default being 22. Using a larger number of voices increases the number of simultaneous notes that can be played, but also lowers the output sampling rate and hence the sound quality.
- Fxx Sets the sampling rate at which Mega-Em stores samples in the UltraSounds memory.
  - F22 Strips the samples to half the normal sampling rate of the UltraSound patches, which is approximately 22kHz. This approximately doubles the number of patches which can be loaded, however also results in noisier music playback. This is the default for 256k UltraSound cards.
  - F44 Loads the samples at the normal sampling rate of the UltraSound patches, which is approximately 44kHz. This results in higher quality music playback. This is the default for 512k, 768k and 1024k UltraSound cards.
- Xx Specify Sound Blaster version to emulate. The default is -X1, emulate original Sound Blaster.
  - X1 Emulate Original Sound Blaster. Some software (including newer Sierra) works better if you use this option.
  - X2 Emulate Sound Blaster 2.0. This option is provided only for completeness. No software tested has required this option, including a number of programs which state they do require a Sound Blaster 2.0. Some newer Sierra games will not work with this option.

#### #4.1.4 THE DEFAULT OPTIONS FILES.

Since many users will use some options all of the time (such as -P), Mega-Em supports the ability to make these default. For both MEGAEM.EXE and EMUSET.EXE you can create a single line text file containing options you would like to be automatically added to the command line. The files should be named MEGAEM.OPT and EMUSET.OPT respectively.

For example if you want always use the -P option, create a single line text file called MEGAEM.OPT in your Mega-Em directory, where the first

line reads:

-P

These text files can be created with any text editor, including the EDIT program supplied with DOS 5 or DOS 6.

#### #4.2.0 CONFIGURING YOUR SOFTWARE FOR USE WITH MEGA-EM.

Software programs are configured for different sound devices in many different ways. Some will attempt to auto-detect sound devices and use the best one it finds, others will prompt you during the running of the program. Most common is the use of a setup program, usually called SETUP, INSTALL or CONFIG. Others require you to delete a configuration file, after which you will be able to change the configuration. For the correct procedure for a specific program, you should consult the program's manual.

Ok, I know how to configure my software, now what?

Well first make sure Mega-Em is loaded and emulation is on. If the program is of the type that auto-detects, just run it and it should detect the devices you are emulating. If you are prompted to select sound devices, select the ones you have set up your emulation for.

But there are too many options there. What do I choose?

For the Roland MT-32 emulation you should look for 'MT-32' or 'LAPC1'. Some software just has 'Roland' as an option. This usually refers to the MT-32. Remember that if you select this option you must run EMUSET -MT, otherwise Mega-Em will by default emulate a Sound Canvas.

For the Roland Sound Canvas emulation you should look for 'Sound Canvas', 'SCC1' or 'General MIDI'.

If you have the option of MT-32 or Sound Canvas, in most cases selecting Sound Canvas will give better performance.

For Sound Blaster emulation look for Sound Blaster (strangely enough). Remember Mega-Em will not play Sound Blaster Music, only digital effects.

Now the program is asking for my sound card settings. What should they be?

If prompted for a MIDI interface, you should select Roland MPU-401.

If prompted for a Roland base address, you must select 330 (hex).

If prompted for a Roland IRQ setting, you should select IRQ 2/9. If your software fails to initialize the Roland, try using the -IRQx switch with MEGAEM.EXE.

If prompted for a Sound Blaster base address, select your UltraSound Base address unless you have used the -SBBxxx switch with MEGAEM.EXE.

If prompted for a Sound Blaster Irq, select your UltraSound MIDI Irq unless you have used the -SBIX switch with MEGAEM.EXE.

If prompted for a Sound Blaster DMA channel, you must select 1.

You should now be ready to run your software. Always remember to load Mega-Em and turn emulation on before running the software. Many programs will crash if set up for a music device, and are then unable to locate it.



#### #4.3.0 A STEP BY STEP EXAMPLE.

This example assumes you have already installed Mega-Em on your hard drive.

In addition, it is assumed you have consulted your program's manual and it states you configure your sound options with a program called INSTALL, and the program is run by typing START <ENTER>.

Step 1. Load MEGAEM.EXE by typing MEGAEM <ENTER>. If you need to use any options type MEGAEM options <ENTER>.

Step 2. Turn on emulation by typing EMUSET <ENTER>. Many programs will only allow you to select sound devices it can detect.

Step 3. Load your program's installation program by typing INSTALL <ENTER>.

Step 4. Answer any prompts until you are prompted to select a sound device.

Assume you are given the following options:

AdLib  
Sound Blaster  
Roland MT-32/LAPC1  
Roland Sound Canvas  
Roland MT-32/LAPC1 with Sound Blaster  
Roland Sound Canvas with Sound Blaster

Step 5. In this case you should select 'Roland Sound Canvas with Sound Blaster' as it will probably give the best music performance and also give digital sound effects. Note that any of the above examples will work with Mega-Em, although the 'AdLib' option will not give any sound, and the 'Sound Blaster' option will not play any music or 'FM' effects.

Step 6. Complete the rest of the prompts from the installation program. If prompted whether or not to save the configuration, select YES.

Step 7. Load your program by typing START <ENTER>. That's it.

Note: You should not have to configure the program again. Just make sure you have loaded Mega-Em and turned on the emulation by running EMUSET.

#### #5.0.0 \*\*\*\* CHAPTER 5. - COMPATIBILITY PROBLEMS WITH VARIOUS SOFTWARE \*\*\*\*

- # 5.1.0 Software that requires 386 protected mode and can not run under a memory manager.
- # 5.2.0 Software which is incompatible with Mega-Em.
  - # 5.2.1 Incompatibilities with all of Mega-Em's Emulations.
  - # 5.2.2 Incompatibilities with Roland Emulation
  - # 5.2.3 Incompatibilities with Sound Blaster DAC Emulation.
- # 5.3.0 Specific software with known compatibility problems.
  - # 5.3.1 Harpoon (Roland)
  - # 5.3.2 Darkseed (Sound Blaster DAC)
  - # 5.3.3 Kings Quest I, Firehawk, Stellar 7 (Sound Blaster DAC)
  - # 5.3.4 Microsoft Windows in Enhanced Mode.
  - # 5.3.5 SBOS and UltraMID.
  - # 5.4.6 Lemmings 2 (Roland).
  - # 5.3.7 The Incredible Machine (General MIDI).

```
# 5.3.8 Budokan (Roland).
# 5.3.9 Vectordemo (Sound Blaster DAC)
# 5.3.10 Older Sierra Titles (Sound Blaster DAC)
# 5.3.11 Netroom 3
# 5.3.12 NHL Hockey
```

#### #5.1 SOFTWARE THAT REQUIRES 386 PROTECTED MODE AND CAN NOT RUN UNDER A MEMORY MANAGER.

A few high-end games use the 386 protected mode to achieve superior performance. Since many of these require full control of the system they will not operate if the system is already in protected mode, such as when a memory manager is loaded (excluding HIMEM.SYS and several shareware EMMs).

Mega-Em uses the power of 386 protected mode for its emulation, and hence the aforementioned games are not compatible with Mega-Em. Examples of known games which exhibit such problems are COMANCHE and ULTIMA 7.

The only current solution is to use SB0S to emulate a Sound Blaster, or if the game supports the use of standard AIL (Miles) drivers, use the UltraSound AIL drivers. Note that the AIL drivers used by ULTIMA 7 are not standard.

Furthermore, most software which use protected mode under a memory manger will also fail with Mega-Em. This is due to the fact that system control is taken away from Mega-Em. Examples of such software are Privateer, Strike Commander, Syndicate and Windows.

#### #5.2.0 SOFTWARE WHICH IS INCOMPATIBLE WITH MEGA-EM.

##### #5.2.1 INCOMPATIBILITIES WITH ALL OF MEGA-EM'S EMULATIONS.

Software Title	Reason	Solution
Comanche	Protected mode conflict	Use SB0S
Doom	Protected mode conflict	Use Native Support
Dracula Unleashed	Protected mode conflict	Use SB0S -x2
IndyCar Racing	Protected mode conflict	Use SB0S -o3
Links 386 (Pro)	Protected mode conflict	Use SB0S
Privateer	Protected mode conflict	Use SB0S
Rebel Assault	Protected mode conflict	Use Native Support
Shadowcaster	Protected mode conflict	Use SB0S
Strike Commander	Protected mode conflict	Use SB0S
Syndicate	Protected mode conflict	Use SB0S
Ultima 7	Protected mode conflict	Use SB0S
Windows	Protected mode conflict	Use UltraSound Windows drivers

##### #5.2.2 INCOMPATIBILITIES WITH ROLAND EMULATION.

Software Title	Reason	Solution
Legend Text Adventures	Needs smart mode compatibility	Use SB0S(No Roland)
Terminator 2029	Unsure	Use AIL drivers

##### #5.2.3 INCOMPATIBILITIES WITH SOUND BLASTER DAC EMULATION.

Software Title	Reason	Solution
----------------	--------	----------

DMP (using -C1 option)	Non-standard DMA operation	Use GUS Support
Flight Simulator 5	Possibly buggy sound driver	May work with SBOS
Mortal Kombat	Protected mode conflict	Use SBOS
Panic	Non-standard DMA operation	Use SBOS
Second Reality	Non-standard DMA operation	Use GUS Support

#### #5.3.0 SPECIFIC SOFTWARE WITH KNOWN INCOMPATIBILITIES.

##### #5.3.1 HARPOON (Roland).

While Harpoon does appear to have an MT-32 sound option, it does not appear to use the Roland MPU-401 MIDI interface. Almost all other software which supports Roland sound devices uses the MPU-401 interface. Hence this is what Mega-Em uses for its emulation, and unfortunately is not compatible with Harpoon.

##### #5.3.2 DARKSEED (Sound Blaster DAC)

You may find Mega-Em gives unstable performance with Darkseed. The Sound Blaster DAC drivers appear to be buggy. There is an update patch available for Darkseed and this should correct any problems.

##### #5.3.3 KINGS QUEST I, FIREHAWK, STELLAR 7 (Sound Blaster DAC)

All of these games have Sound Blaster drivers which will fail to initialize on fast machines. This problem occurs even with a real Sound Blaster. To overcome the problem run EMUSET with the -FAST switch. In addition the above games have drivers hard coded to base address 220, Irq 7.

##### #5.3.4 MICROSOFT WINDOWS IN ENHANCED MODE.

When Microsoft Windows is run in enhanced mode it uses an undocumented interface to communicate with Expanded Memory Managers. While Windows will run correctly in enhanced mode with Mega-Em loaded, upon exiting to DOS the system will crash.

To prevent this from happening, Mega-Em is designed to detect when Windows tries to enter enhanced mode, offering the user the option of using standard mode, or exiting to DOS. Note that Mega-Em's emulations will not work with Windows.

In future revisions of Mega-Em, this problem may be corrected, provided some form of documentation for the interface used can be sourced.

##### #5.3.5 SBOS AND ULTRAMID.

You must not load either Mega-Em, SBOS or UltraMID into memory at the same time. Doing so results in the programs' trying to use the UltraSound at the same time, resulting in impaired performance, and possibly a system crash.

This should not prove to be a problem since all three programs can be removed from memory to allow the loading of one of the others. To remove Mega-Em from memory type MEGAEM -f. To remove SBOS from memory, type SBOS -f. To remove UltraMID from memory, type ULTRAMID -f.

Mega-Em is designed to automatically remove UltraMID and SBOS from memory. UltraMID is designed to automatically remove SBOS from memory.

##### #5.3.6 LEMMINGS 2 (Roland)

With Mega-Em loaded, Lemmings 2 may have palette (colour) problems such as abnormally flashing objects. Currently the only solution is to use a different memory manager, or try removing other resident programs.

#### #5.3.7 THE INCREDIBLE MACHINE (General MIDI).

You may find that Mega-Em produces no output when The Incredible Machine is configured for General MIDI (i.e. Mega-Em is configured for Sound Canvas emulation). This should not be a major problem however, since The Incredible Machine works correctly if you select MT-32 as your sound device.

#### #5.3.8 BUDOKAN (Roland).

To use Budokan successfully with Mega-Em, you should load it by typing BUDO Mt32 <ENTER>. If you choose Roland sound from within the game, you may get no sound output, and the system may be rendered unstable.

#### #5.3.9 VECTORDEMO (Sound Blaster DAC)

This program may not always detect the Sound Blaster Irq correctly. To overcome the problem, you should always run the install section of the demo before executing the demo.

#### #5.3.10 OLDER SIERRA TITLES (Sound Blaster DAC)

If you are having problems with driver initialisation on early Sierra titles and have a fast computer, run EMUSET with the -FAST switch. This should overcome the problem.

#### #5.3.11 NETROOM 3

Mega-Em is not compatible with Netroom's cloaking features. To disable these features run CUSTOMIZ, select CUSTOM SETUP and turn off system and video cloaking in the custom setup menu. Note that the cloaked utilities (DPMI server, disk cache e.t.c.) supplied with Netroom can not be used with Mega-Em.

#### #5.3.12 NHL HOCKEY

You may experience some problems with NHL Hockey when using EMM386 as your memory manager. If this happens you will need to use a third party memory manager such as QEMM or 386MAX.

### #6.0.0 \*\*\*\*\* CHAPTER 6. - SOLUTIONS TO COMMONLY ENCOUNTERED PROBLEMS \*\*\*\*\*

**PROBLEM:** When using Mega-Em, the music sounds choppy or there is a lot of static and clicks.

**SOLUTION:** Many systems allow the ISA bus clock speed to be increased beyond the standard speed of 8 MHz. The Gravis UltraSound is designed to conform to the standard, and will not work reliably on systems with high bus clock speeds. You should be able to reduce the bus clock speed in one of your CMOS setup menus. The CMOS setup is usually accessible by rebooting your computer.

You may have other software which works perfectly with a high bus speed setting. There are two reasons why you may be able to use them, yet not Mega-Em. Firstly a large amount of UltraSound software is written in high level languages such as C. Mega-Em

is written in assembler which generally results in more efficient (faster) code. Secondly Mega-Em is executed in protected mode which results in I/O instructions being executed faster than in virtual 8086 mode or real mode. Both of these situations lead to the UltraSound being unable to 'keep up' with Mega-Em.

**PROBLEM:** Standard system information programs fail to show Mega-Em as being present in memory. Examples of such programs include the DOS MEM command, Nortons System Information, Quarterdeck Manifest etc.

**SOLUTION:** Since Mega-Em installs in a non-standard way beyond the first megabyte of memory, the standard DOS memory allocation system will not know of it's presence. You should however see a drop in free EMS memory after Mega-Em has been loaded, depending on which memory manager you are using. The simplest way to see if Mega-Em is installed in memory is to type EMUSET -? <ENTER>. If Mega-Em is installed, you will see a help screen. If Mega-Em is not installed you will see an error message stating this.

**PROBLEM:** When I have Mega-Em loaded I get annoying pauses while running certain software.

**SOLUTION:** This problem is most prominent with software which uses XMS/EMS memory. It appears to be caused by limitations of the 386/486 paging (virtual memory) system, and hence a side effect of Mega-Em being resident and active in memory. There are several work arounds you may try. Disable or remove any TSR programs which use XMS/EMS such as disk caches. Limit your program's use of XMS/EMS memory, or disk access.

Technical explanation: Memory managers use the 386/486 paging mechanism to provide services such as EMS memory and upper memory. Mega-Em loads high (above 8Mb) in the virtual memory space to avoid conflicts with the memory manager. It appears that the design of the paging mechanism is prone to the occasional glitch, resulting in dramatic loss of speed. For example, loading Mega-Em above the 32Mb mark in the virtual memory space causes noticeable (on some systems intolerable) slow-downs in the system speed. In theory this should not happen. To back this up, the processors have special registers solely for testing the paging mechanism, indicating the designers were expecting problems. The only recourse would be to load Mega-Em below the first megabyte of memory, but this would however use an unpractical amount of precious DOS memory.

#### #7.0.0 \*\*\*\*\* CHAPTER 7. - ANSWERS TO COMMONLY ASKED QUESTIONS \*\*\*\*\*

**QUESTION:** Could Mega-Em be modified so it does not require a 386 memory manager, and hence work with software such as Comanche, Ultima 7 etc. ?

**ANSWER:** No. Mega-Em requires 386 protected mode for it's emulation to operate. It uses the memory manager as a means of entering protected mode, while still remaining compatible with a wide variety of software. Mega-Em can not work with the above mentioned software because they can not coexist with other

protected mode software. Furthermore, despite being able to run with Mega-Em in memory, programs such as Strike Commander will not work with Mega-Em because they take control of the 386 protected mode system, rendering Mega-Em inactive.

QUESTION: Well how come SBOS works with the above mentioned games?

ANSWER: While SBOS is indeed a software emulator, it is hardware assisted by specific features built into the UltraSound card. The features will invoke SBOS when ever a program accesses certain Sound Blaster port addresses. Mega-Em's emulation is 100% software, using special protection features of 386 protected mode.

QUESTION: Could features be added to Mega-Em to allow the UltraSound MIDI port to be used as a Roland MPU-401 MIDI interface?

ANSWER: Yes. This is already planned for future releases of Mega-Em.

QUESTION: Can I have the source code?

ANSWER: No.

QUESTION: Why doesn't Mega-Em support OS/2?

ANSWER: Mega-Em requires operating system privileges to function. OS/2, like many multitasking operating systems will not allow DOS programs to gain these. Most DOS memory managers will. Note that it appears a suitable OS/2 driver would suffice. So anyone contemplating writing OS/2 drivers for the UltraSound should consider implementing similar features to Mega-Em.

## #8.0.0 \*\*\*\*\* CHAPTER 8. - MEGA-EM REVISION HISTORY \*\*\*\*\*

### #VERSION 2.07 02/22/95

- \* Changed version number since this clashed with a special version of Mega-Em.

### #VERSION 2.06 01/19/95

- \* Modified -SB0FF and -SB0N switches for use with UltraSound ACE.

### #VERSION 2.03 01/19/94

- \* EMUSET -OFF no longer returns a "Failed to detect Sound Blaster base address" error.

### #VERSION 2.02 12/22/93

- \* You no longer need to use the -X2 switch with EMUSET for Mega-Em to work with Street Fighter 2 (digital).
- \* Removed beta information from the header of this file.

### #VERSION 2.01 12/13/93

- \* The master volume switch (-Vxx) now works.
- \* Corrected problems with Irq 2 and EMM386.
- \* EMUSET will now check to make sure Sound Blaster Irq's are working.
- \* Added a general purpose check for other resident UltraSound software.
- \* Added -FAST switch to EMUSET for problems with Sierra software on fast machines.
- \* Added support for Netroom 3 (not compatible with Netroom's cloaking).

#VERSION 2.00B023 (Beta) 11/15/93

- \* Corrected lockup problems with the latest SBDIG.ADV drivers.

#VERSION 2.00B022 (Beta) 11/12/93 (No Public Release)

- \* Added master volume control (-Vxx) to EMUSET.
- \* Changed default emulation from MT-32 to Sound Canvas.

#VERSION 2.00B021 (Beta) 11/03/93 (No Public Release)

- \* Now automatically removes SBOS and UltraMID from memory.
- \* Corrected bug with MIDI port initialization.
- \* Corrected bug with DMA and Irq latch priming on UltraSound revisions 3.4 and later.
- \* Now handles ULTRASND.INI files with patch banking definitions.

#VERSION 2.00B020 (Beta) 10/22/93 (No Public Release)

- \* Removed demonstration period since Mega-Em is no longer shareware.
- \* Improved speed of FM register emulation routines.
- \* Added support for a few pieces of software which use non standard and rare Sound Blaster DAC routines.
- \* Modified the music volume control so it now has a more natural response.

#VERSION 1.10B019 (Beta) 10/13/93 (No Public Release)

- \* Improved speed of Sound Blaster 'Direct DAC' routines by 50%.
- \* Added support for 2.6 and 2 bit compressed samples.
- \* Sound Blaster compressed samples now decompress in the background to prevent annoying pauses.
- \* Added routines to remove most of the clicking in the Sound Blaster DMA playback routines. Special enhancements remove clicks that occur when using a real Sound Blaster card.
- \* Corrected bugs in the Sound Blaster DMA routines where Mega-Em would not play the entire sample when very small DMA buffers were used.
- \* Default music volume is now lower to better suit the Sound Blaster DAC

emulation.

#VERSION 1.10B018 (Beta) 09/30/93 (No Public Release)

- \* Better compatibility and cleaner performance from the Sound Blaster DAC emulation. Some techniques still need to be implemented to reduce clicking.
- \* Added routines for playback of Sound Blaster 2:1 compressed samples.

#VERSION 1.10B017 (Beta) 09/25/93 (No Public Release)

- \* Implemented many of the Sound Blaster DAC features. Now works with around 80% of Sound Blaster software. Still needs a lot of fine tuning.

#VERSION 1.10B016 (Beta) 09/09/93 (No Public Release)

- \* Modified initial state of the virtual Roland MIDI interface. Previously the Roland auto-detect on some Lucas Arts adventures would fail.
- \* Added basic support for Sound Blaster DAC emulation. Works only with 'Direct DAC' software.

#VERSION 1.00 08/29/93

- \* Mega-Em will now sustain instruments properly. To counter for stuck notes the /SS option has been added to EMUSET.

#VERSION 1.00B015 (Beta) 08/22/93

- \* Sysex handling routines have been rewritten for improved speed.
- \* Modified protected mode interrupt handlers for increased stability. Should cure problems with emulation failing on some software.
- \* Added support for UltraSound 'backward' samples.
- \* At requests from users, Mega-Em will now display a message to say it is registered.
- \* EMUSET will now handle ULTRASND.INI files which have been edited with a text editor which adds an EOF character to the end of the file.
- \* Several minor touch ups to the UltraSound playback routines.

#VERSION 1.00B014 (Beta) 08/16/93

- \* Fixed a minor bug in the enveloping routines which caused roll-under (i.e. the volume would suddenly go very loud) when certain instruments were played very softly. This has also reduced clicking slightly.
- \* Added /M option to EMUSET to specify the music output volume.
- \* Added Pitch Wheel support. The implementation uses a fixed sensitivity of two semitones. The sensitivity has been fixed because of speed considerations.
- \* Mega-Em should now be stable when running under 386MAX.
- \* Fixed a bug in the uninstallation routines which caused problems with 386MAX (and possibly other memory managers).



- \* Increased demonstration time to 20 minutes.

#VERSION 1.00B013 (Beta) 08/10/93

- \* Fixed problems with the anti-debugger routines incorrectly identifying 386 systems as being in 'no privilege' virtual 8086 mode.
- \* Changed protected mode installation routines slightly. The /NGDT switch has been removed and the /RGDT has been added. See chapter 4 for details.

#VERSION 1.00B012 (Beta) 08/09/93

- \* Due to several 'cracks' appearing for Mega-Em's registration system, Mega-Em is now more resistant against reverse engineering techniques. Side effects include a short pause as Mega-Em loads, larger executable size, slower performance for unregistered users and a low tolerance of memory resident debuggers.
- \* Added /NOEMS switch to MEGAEM.EXE, forcing Mega-Em to load if EMS has been disabled. Useful for users who disable the EMS page frame for extra upper memory, however requires some special considerations. See chapter 4 for details.
- \* The UltraSound playback routines are now stereo. The /MONO switch has been added to disable this, as the occasional piece of music can cause audible crackling during very fast stereo pans.
- \* Made extensive modifications to Mega-Em's protected mode installation routines. Mega-Em should now be exhibit improved compatibility and stability with a wider range of memory managers and computer systems. For stubborn cases two new MEGAEM.EXE options, /FGDT and /NGDT, have been added. See chapter 4 for details.
- \* Temporarily removed support for 386MAX until stability can be guaranteed when using Mega-Em. Currently the system is prone to potentially dangerous system crashes when Mega-Em is loaded with 386MAX.
- \* Added many enhancements to Mega-Em's protected mode interrupt handlers. This has improved stability and now allows Irq 5 to be used for the UltraSound.
- \* Added /F switch to EMUSET to allow the user to specify the sampling rate at which Mega-Em stores patches in the UltraSound DRAM. 44 uses the full sampling rate of the UltraSound patch. 22 strips the sampling rate in half, resulting in approximately twice as many patches being loaded, however also results in noisier playback.
- \* Added /MEM switch to MEGAEM.EXE to allow users to manually specify the amount of memory on their UltraSound card.
- \* Improved enveloping routines for UltraSound non-looped percussion patches.

#VERSION 1.00B011 (Beta) 07/26/93 (No Public Release)

- \* Changed the memory allocation routines slightly. Stops Mega-Em from 'thrashing' the 386 paging mechanism, which was causing noticeable speed slowdowns. This has also removed some incompatibilities introduced with version 1.00B008. The latter appears to be caused by a 386 protected mode processor bug.

- \* Added support for several MT32 sysex messages, including channel note off and reset.
- \* Due to several programs still leaving 'stuck notes', all UltraSound sustained instruments will now slowly fade away.

#VERSION 1.00B010 (Beta) 07/25/93 (No Public Release)

- \* Fixed problems in routines which set sample start, loop start and loop end. Previously Mega-Em would play from the wrong portion of the UltraSound's memory on some samples.
- \* Improved the UltraSound enveloping routines. Patches such as APPLAUSE.PAT now play correctly.

#VERSION 1.00B009 (Beta) 07/22/93

- \* Fixed problems in version 1.00B008 with emulation failing on many systems (except the development system of course). This was related to the bugs regarding the /C01 and /C02 options, which should also work correctly now.
- \* Added the /L switch to EMUSET. This enables the UltraSound line in. Useful if using Mega-Em in conjunction with a real Sound Blaster card.
- \* The UltraSound patch set is now loaded at full sampling rate (approximately 44kHz) for 512k users. In previous versions the sampling rate was halved (approximately 22kHz) resulting in slightly noisy output. The sampling rate is still halved when using 256k.

#VERSION 1.00B008 (Beta) 07/20/93

- \* Temporarily removed the 10 minute demonstration period, until the UltraSound playback routines sound better.
- \* Experimented with the playback of the UltraSound patches. Patches should now play on key, however the envelope on many percussion patches is worse than previous versions of Mega-Em.

#VERSION 1.00B007 (Beta) 07/16/93 (No Public Release)

- \* Added /C01 and /C02 options to EMUSET, allowing Mega-Em to be used in conjunction with a real MPU-401 MIDI interface.
- \* Slowed down certain UltraSound playback routines. On some systems the routines were too efficient (fast) for the UltraSound to keep up.

#VERSION 1.00B006 (Beta) 07/14/93

- \* Fixed problems on some machines with EMUSET crashing at the end of the UltraSound MIDI patch load. This was caused by a 'POPAD bug' present in many 386 and 486 processors.
- \* EMUSET will now default to C:\ULTRASND\MIDI or (ULTRADIR)\MIDI if there is no PatchDir definition in ULTRAMID.INI.
- \* Several minor bugs fixed in the error handling routines.

#VERSION 1.00B005 (Beta) 07/13/93

- \* Fixed ULTRASND environment variable checking. Mega-Em will now load with the UltraSound Record DMA set to something other than 1.

#VERSION 1.00B004 (Beta) 07/12/93

\* First Public Release. Features Roland MT-32 and Sound Canvas emulation using a Gravis UltraSound card as the output device.

#

THE END